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FEE TRANSMITTAL for FY 2002 <small>Patent fees are subject to annual revision.</small>		Complete if Known		
		Application Number	09/853,233	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Filing Date	May 11, 2001	
		First Named Inventor	Steven T. Harshfield	
		Examiner Name	William D. Coleman	
TOTAL AMOUNT OF PAYMENT (\$)		180.00	Group Art Unit	2823
		Attorney Docket No.	M4065.0743/P743	
METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)		
<input type="checkbox"/> Check <input checked="" type="checkbox"/> Credit Card <input type="checkbox"/> Money Order <input type="checkbox"/> Other <input type="checkbox"/> None		3. ADDITIONAL FEES		
<input checked="" type="checkbox"/> Deposit Account		Large Entity Small Entity		
Deposit Account Number 04-1073		Fee Code Fee (\$) Fee Code Fee (\$) Fee Description Fee Paid		
Deposit Account Name Dickstein Shapiro Morin & Oshinsky LLP		105 130 205 65 Surcharge - late filing fee or oath		
The Commissioner is hereby authorized to: (check all that apply)		127 50 227 25 Surcharge - late provisional filing fee or cover sheet.		
<input type="checkbox"/> Charge fee(s) indicated below <input checked="" type="checkbox"/> Credit any overpayments		139 130 139 130 Non-English specification		
<input checked="" type="checkbox"/> Charge any additional fee(s) during the pendency of this application		147 2,520 147 2,520 For filing a request for ex parte reexamination		
<input type="checkbox"/> Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.		112 920* 112 920* Requesting publication of SIR prior to Examiner action		
		113 1,840* 113 1,840* Requesting publication of SIR after Examiner action		
FEE CALCULATION		115 110 215 55 Extension for reply within first month		
1. BASIC FILING FEE		116 400 216 200 Extension for reply within second month		
Large Entity Small Entity		117 920 217 460 Extension for reply within third month		
Fee Code Fee (\$)	Fee Code Fee (\$)	Fee Description		Fee Paid
101 740	201 370	Utility filing fee		
106 330	206 165	Design filing fee		
107 510	207 255	Plant filing fee		
108 740	208 370	Reissue filing fee		
114 160	214 80	Provisional filing fee		
SUBTOTAL (1) (\$)		0.00		
2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE		118 1,440 218 720 Extension for reply within fourth month		
Total Claims	** =	Extra Claims Fee from below		Fee Paid
Independent Claims	** =			
Multiple Dependent				
Large Entity Small Entity		128 1,960 228 980 Extension for reply within fifth month		
Fee Code Fee (\$)	Fee Code Fee (\$)	Fee Description		Fee Paid
103 18	203 9	Claims in excess of 20		
102 84	202 42	Independent claims in excess of 3		
104 280	204 140	Multiple dependent claim, if not paid		
109 84	209 42	** Reissue independent claims over original patent		
110 18	210 9	** Reissue claims in excess of 20 and over original patent		
SUBTOTAL (2) (\$)		0.00		
**or number previously paid, if greater; For Reissues, see above		119 320 219 160 Notice of Appeal		
		120 320 220 160 Filing a brief in support of an appeal		
		121 280 221 140 Request for oral hearing		
		138 1,510 138 1,510 Petition to institute a public use proceeding		
		140 110 240 55 Petition to revive - unavoidable		
		141 1,280 241 640 Petition to revive - unintentional		
		142 1,280 242 640 Utility issue fee (or reissue)		
		143 460 243 230 Design issue fee		
		144 620 244 310 Plant issue fee		
		122 130 122 130 Petitions to the Commissioner		
		123 50 123 50 Processing fee under 37 CFR 1.17(q)		
		126 180 126 180 Submission of Information Disclosure Stmt		
		581 40 581 40 Recording each patent assignment per property (times number of properties)		
		146 740 246 370 Filing a submission after final rejection (37 CFR 1.129(a))		
		149 740 249 370 For each additional invention to be examined (37CFR 1.129(b))		
		179 740 279 370 Request for Continued Examination (RCE)		
		169 900 169 900 Request for expedited examination of a design application		
		Other fee (specify)		
		*Reduced by Basic Filing Fee Paid SUBTOTAL (3) (\$)		
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SUBMITTED BY		Complete (if applicable)		
Name (Print/Type)	Thomas J. D'Amico	Registration No. (Attorney/Agent)	28,371	Telephone (202) 828-2232
Signature		Date	February 13 2003	

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Docket No.: M4065.0743/P743
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Steven T. Harshfield, et al.

Application No.: 09/853,233

Group Art Unit: 2823

Filed: May 11, 2001

Examiner: William D. Coleman

For: PCRAM MEMORY CELL AND
METHOD OF MAKING SAME

INFORMATION DISCLOSURE STATEMENT (IDS)

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Pursuant to 37 C.F.R. § 1.56, the attention of the Patent and Trademark Office is hereby directed to the documents listed on the attached PTO/SB/08. It is respectfully requested that the subject matter of the documents be expressly considered during the prosecution of this application and that the documents be made of record therein and appear among the "References Cited" on any patent to issue from this application. A copy of each document is attached.

A brief explanation of relevance of the non-patent documents listed on form PTO/SB/08 is provided and attached hereto as Appendix A. The brief explanation provided for each document is not tantamount to an admission that a document is "material" or that it qualifies as prior art. The Examiner is respectfully requested to utilize Appendix A only as a tool by which to better categorize the documents for substantive use in examining the claims of the application.

Documents discussed in Appendix A marked with an asterisk (*) are indicated to be potentially more relevant than others. Such marking is provided only to assist the

Examiner; however, the Examiner is requested to thoroughly review all documents cited herein.

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider and cite the listed documents.

The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1073, under Order No. M4065.0743/P743.

Dated: February 13, 2003

Respectfully submitted,

By 

Thomas J. D'Amico

Registration No.: 28,371

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APPENDIX A

* U.S. Published Applicant No. 2002/0072188 to Gilton: this document generally discloses a programmable variable resistance memory cell in which at least a variable resistance layer of the cell is formed in an isolated stack in an insulative layer.

* U.S. Published Applicant No. 2002/0123169 to Moore et al.: this document discloses a programmable variable resistance memory cell having a first conductive layer 16 formed in an opening in a first dielectric layer, a second conductive layer 18 formed on the first conductive layer. A layer of a chalcogenide material is formed in an opening in a second dielectric layer aligned with the opening in the first dielectric layer so that the chalcogenide material is formed on and over the first and second conductive layers, and a third conductive layer 32 is formed over the layer of chalcogenide material. *See* paras. 22, 28 and Fig. 8.

* U.S. Published Applicant No. 2002/0123248 to Moore et al.: this document discloses a programmable variable resistance memory cell having a first conductive layer 16 formed in an opening in a first dielectric layer, a second conductive layer 18 formed on the first conductive layer. A layer of a chalcogenide material is formed in an opening in a second dielectric layer aligned with the opening in the first dielectric layer so that the chalcogenide material is formed on and over the first and second conductive layers, and a third conductive layer 32 is formed over the layer of chalcogenide material. *See* paras. 22, 28 and Fig. 8.

* U.S. Published Applicant No. 2002/0168820 to Kozicki: this document discloses several embodiments of a programmable variable resistance memory cell formed in via. An example of the structure disclosed is illustrated in Fig. 1, which shows a first electrode layer 130, a dielectric layer 150 formed on the electrode layer 130 and having an opening formed therethrough to the electrode layer 130, a chalcogenide layer 140 formed in the opening, a barrier layer 155 formed in the opening on the chalcogenide layer 140, a

second electrode layer 120 formed in the opening on the barrier layer 155, and a contact layer 165 formed on the second electrode layer 120.

*U.S. Patent No. 6,117,720 to Harshfield: this document generally discloses a plug-type stacked structure for a programmable variable resistance memory cell.

*U.S. Patent No. 6,236,059 to Wolstenholme et al.: this document generally discloses a stacked structure for a programmable variable resistance memory structure 55 partially formed in a pore 50.

*U.S. Patent No. 6,300,684 to Gonzalez et al: this document discloses a programmable variable resistance memory cell 200 formed inside a pore 140, 215 formed in a substrate. *See, e.g.*, Figs. 14-15, col. 6, ln. 81 – col. 7, ln. 34.

*U.S. Patent No. 6,316,784 to Zahorik et al.: this document generally discloses a programmable variable resistance memory cell formed inside pores formed in a substrate.

*U.S. Patent No. 6,348,365 to Moore et al.: this document discloses a programmable variable resistance memory cell which includes a first electrode 12, a chalcogenide –metal ion layer 51, a metal layer 41 which supplies metal ions of the type in the layer 51, and a second electrode 61. *See* Fig. 6.

*U.S. Patent No. 6,391,688 to Gonzalez et al.: this document is a divisional of U.S. Patent No. 6,300,684 and discloses a programmable variable resistance memory cell 200 formed inside a pore 140, 215 formed in a substrate. *See, e.g.*, Figs. 14-15, col. 6, ln. 81 – col. 7, ln. 34.

*WO 00/48196 to Kozicki et al.: this document discloses several embodiments of a programmable variable resistance memory cell formed in via. An example of the structure disclosed is illustrated in Fig. 2, which shows a first electrode layer 230, a dielectric layer formed on the electrode layer 230 and having an opening formed therethrough to the electrode layer 230, a barrier layer 250 formed in the opening and on

the first electrode layer 230, a chalcogenide layer 240 formed in the opening on the barrier layer 250, a second electrode layer 220 formed in the opening on the chalcogenide layer 240, and a contact layer formed on the second electrode layer 220.

*WO 02/21542 to Kozicki: this document is the international equivalent to U.S. Published Application No. 2002/0168820 and discloses several embodiments of a programmable variable resistance memory cell formed in via. An example of the structure disclosed is illustrated in Fig. 1, which shows a first electrode layer 130, a dielectric layer 150 formed on the electrode layer 130 and having an opening formed therethrough to the electrode layer 130, a chalcogenide layer 140 formed in the opening, a barrier layer 155 formed in the opening on the chalcogenide layer 140, a second electrode layer 120 formed in the opening on the barrier layer 155, and a contact layer 165 formed on the second electrode layer 120.

Abdel-All, et al., Vacuum 59 (2000) 845-853: published in December, this document generally relates to, inter alia, the electrical properties of $\text{Ge}_5\text{As}_{38}\text{Te}_{57}$ as a function of temperature.

*Adler and Moss, J. Vac. Sci. Technol. 9 (1972) 1182-1189: this document generally relates to, inter alia, two types of electrical/material switching – threshold and memory, in amorphous materials; the effects of temperature, pressure, and frequency on switching; and the physics of threshold voltage and memory.

Adler et al., Ref. Mod. Phys. 50 (1978) 209-220: this document generally relates to, inter alia, threshold switching in amorphous alloys, state (“on” and “off”) characteristics, and glass properties.

Afifi, et al., Appl. Phys. A 55 (1992) 167-169: this document generally relates to, inter alia, SeGe-Sb glasses.

*Afifi, et al., J. Phys. 17 (1986) 335-342: this document generally relates to, inter alia, electrical and thermal conductivity of $\text{Ge}_x\text{Se}_{1-x}$ compositions as a function of temperature. $\text{Ge}_{25}\text{Se}_{75}$ stoichiometry is disclosed.

Alekperova and Gadzhieva, 23 (1987) 137-139: this document generally relates to, inter alia, a characteristic diode state in Ag_2Se compositions upon heating (to 376-400°K).

*Aleksiejunas and Cesnys, Phys. Stat. Sol. (a) 19 (1973) K169-K171: this document generally relates to, inter alia, the subjects of selenium investigation and how $\text{Se-Ag}_2\text{Se}$ contributes silver ions to a selenium composition.

Angell, Annu. Rev. Phys. Chem. 43 (1992) 693-717: this document generally relates to, inter alia, the presence of ion conductors in solids.

Aniya, Solid State Ionics 136-137 (November 2,2000) 1085-1089: this document generally relates to, inter alia, ion conductor glasses.

Asahara and Izumitani, J. Non-Cryst. Solids 11 (1972) 97-104: this document generally relates to, inter alia, Cu-As-Se glass.

Asokan, et al., Phys. Rev. Lett. 62 (1989) 808-810: this document generally relates to, inter alia, $\text{Ge}_x\text{Se}_{100-x}$ glasses and their transition from semiconductor-like material to metal-like material.

Baranovskii and Cordes, J. Chem. Phys. 111 (1999) 7546-7557: this document generally relates to, inter alia, ionic glasses and conduction (percolation theory).

Belin et al., Sol. St. Ionics 136-137 (November 2,2000) 1025-1029: this document generally relates to, inter alia, conductivity spectra of the glass $0.5\text{Ag}_2\text{S}-0.5\text{GeS}_2$ and the temperature dependency of the conductivity.

Belin, et al., Solid State Ionics 143 (July 2,2001) 445-455: this document generally relates to, inter alia, the electrical properties of $\text{Ag}_7\text{GeSe}_5\text{I}$ – an argyrodite compound.

Benmore and Salmon, Phys. Rev. Lett. 73 (1994) 264-267: this document generally relates to, inter alia, the characteristics of chalcogenide alloys.

Bernede, Thin Solid Films 70 (1980) L1-L4: this document is in the French language and the Applicant has no translation. It is presently understood to generally relate to, inter alia, metal- Ag_2Se -metal sandwich devices.

Bernede, Thin Solid Films 81 (1981) 155-160: this document generally relates to, inter alia, memories of selenium alloys with metal (e.g., Ag) electrodes, where the “on” memory states require constant voltage.

Bernede, Phys. Stat. Sol. (a) 57 (1980) K101-K104: this document generally relates to, inter alia, metal- Ag_2Se -P systems.

Bernede and Abachi, Thin Solid Films 131 (1985) L61-L64: this document generally relates to, inter alia, metal-insulator-metal thin films with electroforming effects; the films have silver, gold and copper electrodes.

*Bernede, et al., Thin Solid Films 97 (1982) 165-171: this document generally relates to, inter alia, $\text{Ag}_2\text{Se}/\text{Se}/\text{Metal}$ thin film sandwiches, which were studied by shape of electrodes (e.g., symmetrical or asymmetrical).

Bernede, et al., Phys. Stat. Sol. (a) 74 (1982) 217-224: this document generally relates to, inter alia, switching in $\text{Al-Al}_2\text{O}_3\text{Ag}_{2-x}\text{Se}_{1+x}$ devices.

Bondarev and Pikhitsa, Solid State Ionics 70/71 (1994) 72-76: this document generally relates to, inter alia, $\text{Ag}^{(-)}/\text{RbAg}_4\text{I}_5$ boundary – depletion layer, and dendritic electrodeposition.

*Boolchand, Asian Journal of Physics (2000) 9, 709-72: this document generally relates to, inter alia, $\text{Ge}_x\text{Se}_{1-x}$ glasses, which have selenium-rich and germanium-rich clusters, and the intrinsically-broken bond characteristics thereof.

*Boolchand and Bresser, Nature 410 (2001) 1070-1073: published April 26, this document generally relates to, inter alia, Ag_2Se as an electrolyte additive to glass, e.g., GeSe_4 . $\text{Ge}_{30}\text{Se}_{70}$ glass was found not to work well because of Ag_2Se crystallization.

*Boolchand, et al., J. Optoelectronics and Advanced Materials, 3 (September 2001), 703: this document generally relates to, inter alia, a review of Raman tool scattering of chalcogenide glasses. The floppyness and rigidity is observed. $\text{Ge}_x\text{Se}_{1-x}$ is disclosed, as is a stoichiometry of $\text{Ge}_{25}\text{Se}_{75}$.

Boolchand and Grothaus, Eds. Chadi and Harrison, Proc. Int. Conf. Phys, Semicond., 17th (1985) 833-36: this document generally relates to, inter alia, GeSe and GeS glasses and the importance of a broken chemical order therein.

*Boolchand, et al., Properties and Applications of Amorphous Materials, M.F. Thorpe and Tichy, L. (eds.) Kluwer Academic Publishers, the Netherlands, 2001, pp. 97-132: this document generally relates to, inter alia, the prediction of glass rigidity in $\text{Ge}_x\text{Se}_{1-x}$ glass, e.g., $\text{Ge}_{23}\text{Se}_{77}$.

*Boolchand, et al., Diffusion and Defect Data, Vol. 53-54 (1987) 415-420: this document generally relates to, inter alia, thermal annealing of $\text{Ge}_x\text{Se}_{1-x}$ films.

*Boolchand, et al., Phys. Rev. B 25 (1982) 2975-2978: this document generally relates to, inter alia, the examination of GeSe glass having Sn impurities by Mossbauer spectroscopy. Investigations into glass network topology, which has an intrinsically broken bond backbone, suggesting Ge and Se rich clusters.

Boolchand, et al., Sol. State Comm. 45 (1983) 183-185: this document generally relates to, inter alia, $\text{Ge}_x\text{Se}_{1-x}$ and $\text{Ge}_x\text{S}_{1-x}$ glasses.

*Boolchand and Bresser, Dep. Of ECECS, Univ. Cincinnati 45221-0030: this document generally relates to, inter alia, $\text{Ge}_x\text{Se}_{1-x}$ and the relation of glass transition temperature to Ge concentration in backbone. Although the publication date of this reference is not known to the Applicant, it was revised October 28, 1999 and is believed to be publicly available at the University of Cincinnati, Department of Electrical and Computer Engineering and Computer Science.

Bresser, et al., Phys. Rev. Lett. 56 (1986) 2493-2496: this document generally relates to, inter alia, an investigation of c- GeSe_2 structure.

Bresser, et al., J. de Physique 42 (1981) C4-193-C4-196: this document generally relates to, inter alia, the characteristics of GeSe_2 and GeS_2 glasses.

Bresser, et al., Hyperfine Interactions 27 (1986) 389-392: this document generally relates to, inter alia, germanium selenide glasses doped with tellurium.

Cahen, et al., Science 258 (1992) 271-274: this document generally relates to, inter alia, chalcopyrite CuInSe_2 glasses.

Chatterjee, et al., J. Phys. D: Appl. Phys. 27 (1994) 2624-2627: this document generally relates to, inter alia, $\text{As}_x\text{Te}_{100-x-y}\text{Se}_y$ glasses and the current, voltage, and electrical switching behavior. Discloses applicability in read mostly memories.

*Chen and Tai, Appl. Phys. Lett. 37 (1980) 1075-1077: this document generally relates to, inter alia, silver photodoping of $\text{Ge}_x\text{Se}_{1-x}$ and whisker formation (crystalline Ag_2Se).

Chen and Cheng, J. Am. Ceram. Soc. 82 (1999) 2934-2936: this document generally relates to, inter alia, germanium containing chalcogenides doped with Si_3N_4 .

Chen, et al., J. Non-Cryst. Solids 220 (1997) 249-253: this document generally relates to, inter alia, $\text{As}_{10}\text{Ge}_{30}\text{Se}_{60}$ glasses (and the like) doped with Si_3N_4 .

Cohen, et al., J. Non-Cryst. Solids 8-10 (1972) 885-891: this document generally relates to, inter alia, Ge-Te-X glasses as memory devices.

Croitoru, et al., J. Non-Cryst. Solids 8-10 (1972) 781-786: this document generally relates to, inter alia, the physics of conductivity in Ge-containing films.

Dalven and Gill, J. Appl. Phys. 38 (1967) 753-756: this document generally relates to, inter alia, beta-Ag₂Te.

Davis, Search 1 (1970) 152-155: this document generally relates to, inter alia, the subject of amorphous semiconductors as compared to glass.

*Dearnaley, et al., Rep. Prog. Phys. 33 (1970) 1129-1191: this document generally relates to, inter alia, background information about glass and memory.

*Dejus, et al., J. Non-Cryst. Solids 143 (1992) 162-180: this document generally relates to, inter alia, Ag-Ge-Se glass with Ag primarily bonded to Se. The reference discloses glass preparation.

den Boer, Appl. Phys. Lett. 40 (1982) 812-813: this document generally relates to, inter alia, a-Si:H sandwich structures and threshold switching from a low to high conductance.

Drusedau, et al., J. Non-Cryst. Solids 198-200 (1996) 829-832: this document generally relates to, inter alia, work with a-Si:H multilayers optoelectrical properties.

El Bouchairi, et al., Thin Solid Films 110 (1983) 107-113: this document generally relates to, inter alia, Ag_{2-x}Se_{1+x} thin film electrical characteristics and metal-like conduction.

El Gharas, et al., J. Non-Cryst. Solids 155 (1993) 171-179: this document generally relates to, inter alia, photoconductivity of amorphous Se and Ge-Se alloy evaporated films, and reduction of photocurrent by increase of Ge content.

*El Ghrandi, et al., Thin Solid Films 218 (1992) 259-273: this document generally relates to, inter alia, GeSe films deposited by PECVD, Ag evaporation deposition onto glass and photodissolution into same, and optical properties are investigated. GeSe stoichiometries of 30/70 and 25/75, respectively, are disclosed.

*El Ghrandi, et al., Phys. Stat. Sol. (a) 123 (1991) 451-460: this document generally relates to, inter alia, dissolution of Ag into GeSe_{5.5} glass by flash evaporation.

El-kady, Indian J. Phys. 70 A (1996) 507-516: this document generally relates to, inter alia, Ge₂₁Se₁₇Te₆₂ glass and memory, switching, and current controlled negative resistance.

Elliott, J. Non-Cryst. Solids 130 (1991) 85-97: this document generally relates to, inter alia, mechanisms of photodissolution of metals (e.g., Ag) in chalcogenides based on ionic and electronic charge carriers.

*Elliott, J. Non-Cryst. Sol. 130 (1991) 1031-1034: this document generally relates to, inter alia, the photodissolution of metals (e.g., Ag) in chalcogenide glasses and the physics thereof.

Elsamanoudy, et al., Vacuum 46 (1995) 701-707: this document generally relates to, inter alia, studies of quaternary chalcogenide films with Te-As-Ge-Si sandwich structures between electrodes.

*El-Zahed and El-Korashy, Thin Solid Films 376 (November 1, 2000) 236-240: this document generally relates to, inter alia, Ge₂₀Bi_xSe_{80-x} film analysis regarding conduction and changes from p to n type.

Fadel, Vacuum 44 (1993) 851-855: this document generally relates to, inter alia, a study of the switching and memory characteristics of Se₇₅Ge_{25-x}As_x films.

*Fadel and El-Shair, Vacuum 43 (1992) 253-257: this document generally relates to, inter alia, $\text{Se}_{75}\text{Ge}_7\text{Sb}_{18}$ glass electrical conduction and thermal character.

Feng, et al., Phys. Rev. Lett. 78 (1997) 4422-4425: this document generally relates to, inter alia, germanium selenide and germanium sulfide materials.

*Feng, et al., J. Non-Cryst. Solids 222 (1997) 137-143: this document generally relates to, inter alia, the structural character of $\text{Ge}_x\text{S}_{1-x}$ glass, e.g., hardness and elasticity.

*Fischer-Colbrie, et al., Phys. Rev. B 38 (1988) 12388-12403: this document generally relates to, inter alia, photodiffused Ag-GeSe₂ and the interaction between doped Ag with Se atoms and Ge with Ge atoms.

Fleury, et al., Phys. Stat. Sol. (a) 64 (1981) 311-316: this document generally relates to, inter alia, amorphous selenium films and their conductance.

Fritzsche, J. Non-Cryst. Sol. 6 (1971) 49-71: this document generally relates to, inter alia, background information on chalcogenides as semiconductors.

Fritzsche, Annual Review of Mat. Sci. 2 (1972) 697-744: this document generally relates to, inter alia, background information on amorphous semiconductors.

Gates, et al., J. Am. Chem. Soc. (2001): this document generally relates to, inter alia, creating Ag₂Se nanowires by chemical reaction.

Gosain, et al., Jap. J. Appl. Phys. 28 (1989) 1013-1018: this document generally relates to, inter alia, germanium telluride glasses sandwiched in electrodes and the physics thereof.

*Guin et al., J. Non-Cryst. Sol. 298 (March 28,2002) 260-269: this document generally relates to, inter alia, germanium selenide (GeSe) glass with low hardness, the mechanical properties of which are investigated. Stoichiometries of the glass are disclosed as being, inter alia, 10/90, 20/80, and 30/70, respectively.

*Guin et al., J. Am. Ceram. Soc. 85 (June 2002) 1545-1552: this document generally relates to, inter alia, germanium selenide glasses and a study of the hardness properties thereof. Glass stoichiometries of 40/60 and 20/80, respectively, are disclosed.

Gupta, J. Non-Cryst. Sol. 3 (1970) 148-154: this document generally relates to, inter alia, switching in chalcogenides.

Haberland and Stiegler, J. Non-Cryst. Solids 8-10 (1972) 408-414: this document generally relates to, inter alia, glasses containing Te, As, Ge, and Si, and pulse sequence and time factors in switching.

Haifz, et al., J. Apply. Phys. 54 (1983) 1950-1954: this document generally relates to, inter alia, As-Se-Cu glasses.

Hajto, et al., Int. J. Electronics 73 (1992) 911-913: this document generally relates to, inter alia, metal/a-Si:H/metal devices.

Hajto, et al., J. Non-Cryst. Solids 266-269 (May 1,2000) 1058-1061: this document generally relates to, inter alia, a-Si:H ion conductors, polarity-dependant digital and analogue memory, and dependency on contact metals.

Hajto, et al., J. Non-Cryst. Solids 198-200 (1996) 825-828: this document generally relates to, inter alia, electroformed V/a-Si:H/Cr devices.

Hajto, et al., Phil. Mag. B 63 (1991) 349-369: this document generally relates to, inter alia, p+ type amorphous Si memory structures with polarity dependent analogue switching.

Hayashi, et al., Japan. J. Appl. Phys. 13 (1974) 1163-1164: this document generally relates to, inter alia, Au-CdS(CdSe)-Au systems and metal-Se-Sn-SnO₂ systems.

*Hegab, et al., Vacuum 45 (1994) 459-462: this document generally relates to, inter alia, Ge₂₀M₇₅Sb₁₈ glass electrical conduction and thermal character.

Hirose and Hirose, J. Appl. Phys. 47 (1976) 2767-2772: this document generally relates to, inter alia, Ag photodoped As_2S_3 , polarized switching, and dendrite formation.

Hong and Speyer, J. Non-Cryst. Solids 116 (1990) 191-200: this document generally relates to, inter alia, Cd-Ge-As glass with Ag contacts.

Hosokawa, J. Optoelectronics and Advanced Materials 3 (2001) 199-214: this document generally relates to, inter alia, x-ray scattering experiments on glassy $\text{Ge}_x\text{Se}_{1-x}$.

Hu, et al., J. Non-Cryst. Solids 227-230 (1998) 1187-1191: this document generally relates to, inter alia, a-Si:H with Cr and V electrodes.

Hu, et al., Phil. Mag. B. 74 (1996) 37-50: this document generally relates to, inter alia, a-Si:H glasses doped with Cr and analogue memory.

Hu, et al., Phil. Mag. B 80 (January 1, 2000) 29-43: this document generally relates to, inter alia, a-Si:H films doped with Cr-p+.

Iizima, et al., Solid State Comm. 8 (1970) 153-155: this document generally relates to, inter alia, switching and memory effects in As-Te- $\text{I}^{1,2}$ and As-Te-Ge-Si³ glass systems. Thermal breakdown is proposed switching effect.

Ishikawa and Kikuchi, J. Non-Cryst. Solids 35 & 36 (1980) 1061-1066: this document generally relates to, inter alia, Ge_2S_2 films with Ag photodissolved therein.

*Iyetomi, et al., J. Non-Cryst. Solids 262 (February 2000) 135-142: this document generally relates to, inter alia, Ag/Ge/Se glasses as a composite of GeSe_2 and Ag_2Se (a fast ion conductor) and polarizability of Se ions.

Jones and Collins, Thin Solid Films 40 (1977) L15-L18: this document generally relates to, inter alia, switching in Se films and switching back with reverse pulse.

Joullie and Marucchi, Phys. Stat. Sol. (a) 13 (1972) K105-K109: this document generally relates to, inter alia, As₂Se₇ glass.

Joullie and Marucchi, Mat. Res. Bull. 8 (1973) 433-442: this document generally relates to, inter alia, As₂Se₅ film conduction and switching.

Kaplan and Adler, J. Non-Cryst. Solids 8-10 (1972) 538-543: this document generally relates to, inter alia, thermal effects on semiconductor switching.

*Kawaguchi, et al., J. Appl. Phys. 79 (1996) 9096-9104: this document generally relates to, inter alia, Ag-rich chalcogenide glass, Ge₃S₇-Ag and Ge₃₀Se₇₀-Ag, max Ag content of 67%, graphs phase diagram, and discloses that Ag works better than Cu.

*Kawaguchi and Masui, Jpn. J. Appl. Phys. 26 (1987) 15-21: this document generally relates to, inter alia, silver photodoping of chalcogenide films, e.g., Ge₃₀Se₇₀ films.

*Kawasaki, et al., Solid State Ionics 123 (1999) 259-269: this document generally relates to, inter alia, the electrical properties of Ag_x(GeSe₃)_{1-x}, conductivity EMF measurements, glass composition, X-ray diffraction, T_g and T_c, Ag ion transport, and glass structure.

*Kluge, et al., J. Non-Cryst. Solids 124 (1990) 186-193: this document generally relates to, inter alia, photodiffusion of silver into Ge_xSe_{100-x} layers, how this differs from ion beam induced diffusion, Ge₃₀Se₇₀ stoichiometry, Ag₂Se, and percolation threshold.

*Kolobov, J. Non-Cryst. Solids 198-200 (1996) 728-731: this document generally relates to, inter alia, p-type conductive chalcogenides, materials, and physics thereof.

*Kolobov, J. Non-Cryst. Solids 137-138 (1991) 1027-1030: this document generally relates to, inter alia, doped and undoped glass layers as a p-n junction.

Korkinova and Andreichin, J. Non-Cryst. Solids 194 (1996) 256-259: this document generally relates to, inter alia, polarization of chalcogenide glass as depending on the materials used for electrode contacts.

*Kotkata, et al., Thin Solid Films 240 (1994) 143-146: this document generally relates to, inter alia, GeSe glass switching and film thickness, memory, current filament, chemical and mechanical switching properties, and discloses that heat treatment or aging improves switching.

Lakshminarayan, et al., J. Instn. Electronics & Telecom. Engrs. 27 (1981) 16-19: this document generally relates to, inter alia, tellurium-containing chalcogenide glasses.

Lal and Goyal, Indian Journal of Pure & Appl. Phys. 29 (1991) 303-304: this document generally relates to, inter alia, theory on chalcogenide switching.

*Leimer et al., Phys. Stat. Sol. (a) 29 (1975) K129-K132: this document generally relates to, inter alia, germanium selenide glass polarization behavior, e.g., inductive and capacitive components.

*Leung, et al., Appl. Phys. Lett. 46 (1985) 543-545: this document generally relates to, inter alia, photoinduced diffusion of Ag into $\text{Ge}_x\text{Se}_{1-x}$ and techniques for same.

Matsushita, et al., Jap. J. Appl. Phys. 11 (1972) 1657-1662: this document generally relates to, inter alia, Se-SnO₂ film switching and reversibility.

Matsushita, et al., Jpn. J. Appl. Phys. 11 (1972) 606: this document generally relates to, inter alia, polarized memory effect in Se films.

Mazurier, et al., Journal de Physique IV 2 (1992) C2-185 - C2-188: this document generally relates to, inter alia, Te-based glasses.

Messoussi, et al., Mat. Chem. And Phys. 28 (1991) 253-258: this document generally relates to, inter alia, selenium films and Bi electrodes.

*Mitkova and Boolchand, J. Non-Cryst. Solids 240 (1998) 1-21: this document generally relates to, inter alia, the analysis of Group IV and V chalcogenides.

*Mitkova and Kozicki, J. Non-Cryst. Solids 299-302 (May 14, 2002) 1023-1027: this document generally relates to, inter alia, photodissolution of Ag into Se-rich Ge-Se glasses for use in memory devices. In particular, this reference discloses on page 1024 and Fig. 1 a programmable metallization memory cell formed in via and including a metal electrode layer formed on a substrate, an Ag-containing chalcogenide layer formed on the metal electrode, an Ag layer formed on the chalcogenide layer, and another metal electrode formed on the Ag layer. The information disclosed in this reference was available to and known by the inventors prior to the filing of the application.

*Mitkova, et al., Phys. Rev. Lett. 83 (1999) 3848-3851: this document generally relates to, inter alia, Ag doped chalcogenides, $\text{Ge}_{20}\text{Se}_{80}$ stoichiometry is disclosed, Se rich glasses, Ge rich glasses, stoichiometric glasses, and presence of Ag_2Se .

*Miyatani, J. Phys. Soc. Japan 34 (1973) 423-432: this document generally relates to, inter alia, electrical and ionic properties of solid solutions (e.g., doped glass), polarization, conductivity, Ag_2Se and Cu_2Se .

Miyatani, J. Phys. Soc. Japan 13 (1958) 317: this document generally relates to, inter alia, experiments regarding the electronic conductivity, ionic conductivity, hall constant, thermoelectric power, and Nernst coefficient of Ag_2Se as function of the e.m.f., E, the galvanic cell, or the deviation from stoichiometric composition.

*Miyatani, J. Phys. Soc. Japan 14 (1959) 996-1002: this document generally relates to, inter alia, Ag_2Te and Ag_2Se ion conduction and the chemical potential of silver ions.

Mott, J. Non-Cryst. Sol. 1 (1968) 1-17: this document generally relates to, inter alia, glasses with vanadium or iron.

*Nakayama, et al., Jpn. J. Appl. Phys. 32 (1993) 564-569: this document generally relates to, inter alia, electrically erasable nonvolatile memories in chalcogenide films of $\text{As}_x\text{Sb}_y\text{Te}_z$, flash evaporative deposition techniques, a high set-voltage compared to read-voltage, V_t creates a “filament,” and refresh-type pulse.

*Nakayama, et al., Jpn. J. Appl. Phys. 39 (November 15, 2000) 6157-6161: this document generally relates to, inter alia, phase transition random access memory (PRAM) made of chalcogenide glass.

*Nang et al., Jap. J. App. Phys. 15 (1976) 849-853: this document generally relates to, inter alia, $\text{Ge}_x\text{Se}_{1-x}$ electrical and optical properties; it also discloses $\text{Ge}_{.80}\text{Se}_{.20}$, $\text{Ge}_{.60}\text{Se}_{.40}$, and $\text{Ge}_{.50}\text{Se}_{.50}$.

Narayanan, et al., Phys. Rev. B 54 (1996) 4413-4415: this document generally relates to, inter alia, chalcogenide glass switching as thermally originated.

*Neale and Aseltine, , IEEE Transactions On Electron Dev. Ed-20 (1973) 195-209: this document generally relates to, inter alia, read mostly memories with chalcogenides (e.g., Ge, Te), also discloses “floating gate,” and material combinations including Ge and Se.

Ovshinsky and Fritzsche, Metallurgical Transactions 2 (1971) 641-645: this document generally relates to, inter alia, reversible changes in amorphous Si, Be, and B using a laser to write and erase.

Ovshinsky, Phys. Rev. Lett. 21 (1968) 1450-1453: this document generally relates to, inter alia, rapid and reversible resistive switching by electric field in amorphous semiconductors.

Owen, et al., IEE Proc. 129 (1982) 51-54: this document generally relates to, inter alia, a-Si:H, gold or aluminum dots and silver paste.

Owen, et al., Phil. Mag. B 52 (1985) 347-362: this document generally relates to, inter alia, photoinduced chalcogenide effects (As_2S_3) both reversible and irreversible.

*Owen, et al., Int. J. Electronics 73 (1992) 897-906: this document generally relates to, inter alia, threshold and memory switching a-Si:H ion conductor, polarity-dependant digital memory, analogue memory, and device operation dependency on metal contacts.

Pearson and Miller, App. Phys. Lett. 14 (1969) 280-282: this document generally relates to, inter alia, glass diodes.

*Pinto and Ramanathan, Appl. Phys. Lett. 19 (1971) 221-223: this document generally relates to, inter alia, electric field inducement of glass switching “filamentary” path.

Popescu, Solid-State Electronics 18 (1975) 671-681: this document generally relates to, inter alia, the physics of chalcogenide switching.

Popescu and Croitoru, J. Non-Cryst. Solids 8-10 (1972) 531-537: this document generally relates to, inter alia, switching behavior and thermal instability in chalcogenide glasses.

Popov, et al., Phys. Stat. Sol. (a) 44 (1977) K71-K73: this document generally relates to, inter alia, investigations into threshold and memory switching effects in amorphous selenium with electrodes of Ca, Ni, Ag, and Al.

*Prakash, et al., J. Phys. D: Appl. Phys. 29 (1996) 2004-2008: this document generally relates to, inter alia, switching of $\text{Ge}_{10}\text{As}_{45}\text{Te}_{45}$ glass, study of threshold voltage concept and switch back to off, suitability for read mostly memory.

Rahman and Sivarama, Mat. Sci. Eng. B12 (1992) 219-222: this document generally relates to, inter alia, chalcogenide glass with no exothermic crystallization reaction above T_g being of a threshold-switching type.

*Ramesh, et al., Appl. Phys. A 69 (1999) 421-425: this document generally relates to, inter alia, electrical switching in GeTe with Ag or Cu and thermal character investigations.

Rose, et al., J. Non-Cryst. Solids 115 (1989) 168-170: this document generally relates to, inter alia, a-Si with Cr or V contacts.

Rose et al., Mat. Res. Soc. Symp. Proc. V258 (1992) 1075-1080: this document generally relates to, inter alia, a-Si:H memory.

Schuoocker and Rieder, J. Non-Cryst. Solids 29 (1978) 397-407: this document generally relates to, inter alia, As-Te-Ge film sandwiches with Molybdenum electrodes.

Sharma and Singh, Proc. Indian Natn. Sci. Acad. 46, A, (1980) 362-368: this document generally relates to, inter alia, evaporated Se films and their electrical conductivity.

*Sharma, Ind. J. Of Pure and Applied Phys. 35 (1997) 424-427: this document generally relates to, inter alia, n-type Ag_2Se and other material stoichiometries. The device conductivity is analyzed, as is the grain size as a factor in device ability to polarize.

Snell, et al., J. Non-Cryst. Solids 137-138 (1991) 1257-1262: this document generally relates to, inter alia, a-Si:H analogue memory by applying voltages of increasing magnitude.

Snell et al., Mat. Res. Soc. Symp. Proc. V 297 (1993) 1017-1021: this document generally relates to, inter alia, a-Si:H analogue memory.

Steventon, J. Phys. D: Appl. Phys. 8 (1975) L120-L122: this document generally relates to, inter alia, switching in chalcogenides, resistively changes, and formation of microfilaments at switch.

Steventon, J. Non-Cryst. Solids 21 (1976) 319-329: this document generally relates to, inter alia, chalcogenide switching with pulses and multiple pulse resetting.

Stocker, App. Phys. Lett. 15 (1969) 55-57: this document generally relates to, inter alia, switching character of bulk and thin film glasses.

Tanaka, Mod. Phys. Lett. B 4 (1990) 1373-1377: this document generally relates to, inter alia, photodoping mechanism and Ag/As₃₀Se₇₀.

Tanaka, et al., Solid State Comm. 8 (1970) 387-389: this document generally relates to, inter alia, thermal effect on switching in chalcogenides and As-Te-(Ge or Si).

*Thornburg, J. Elect. Mat. 2 (1973) 3-15: this document generally relates to, inter alia, division of chalcogenides into stoichiometric compounds with no changes upon crystallization, stoichiometric compounds with changes upon crystallization, and non-stoichiometric which phase separate on crystallization, As₂Se, and filament growth as a function of bias applied.

Thornburg, J. Non-Cryst. Solids 11 (1972) 113-120: this document generally relates to, inter alia, As₂Se₃ glass switching sandwich structure.

*Thornburg and White, (1972) 4609-4612: this document generally relates to, inter alia, precipitation of As particles out of As₂Se₃ glass and the alignment in a filament.

*Tichy and Ticha, J. Non-Cryst. Solids 261 (2000) 277-281: published in January, this document generally relates to, inter alia, Ge_xSe_{1-x} glass forming ability and 20/80 respective stoichiometry.

Titus, et al., Phys. Rev. B 48 (1993) 14650-14652: this document generally relates to, inter alia, percolation and chemical thresholds of chalcogenide glass.

*Tranchant, et al., Proceedings of the 6th Riso International Symposium. 9-13 September 1985: this document generally relates to, inter alia, GeSe glass with Ag, silver photodissolution, and generation of Ag₂Se.

Tregouet and Bernede, Thin Solid Films 57 (1979) 49-54: this document generally relates to, inter alia, Ag₂Te glass characteristics.

Uemura, et al., J. Non-Cryst. Solids 117-118 (1990) 219-221: this document generally relates to, inter alia, Ge₄Se₆ raman measurements and glass structure.

*Uttecht, et al., J. Non-Cryst. Solids 2 (1970) 358-370: this document generally relates to, inter alia, As-Te-Ge glass, V_t switching, filament formation, and reversal of voltage causes filament to grown in opposite direction.

Viger, et al., J. Non-Cryst. Solids 33 (1976) 267-272: this document generally relates to, inter alia, Se films dark-conductivity and photoconductivity.

*Vodenicharov, et al., Mat. Chem. and Phys. 21 (1989) 447-454: this document generally relates to, inter alia, M-GeSe-M films investigation for dc conductivity.

Wang, et al., IEEE Electron Dev. Lett. 13 (1992) 471-472: this document generally relates to, inter alia, antifuses.

Weirauch, App. Phys. Lett. 16 (1970) 72-73: this document generally relates to, inter alia, chalcogenide device resistively changes in high electric fields.

*West, et al., J. Electrochem. Soc. 145 (1998) 2971-2974: this document generally relates to, inter alia, Ag/As₂₄S₃₆Ag₄₀/Ag systems and Ag transport.

*West, Ph.D. Dissertation, ASU 1998: this document generally relates to, inter alia, metal dendrite memory with Ag or Cu doped solid electrolyte, photodissolution of Ag into As_2S_3 glass, lateral devices with silver electrodes, vertical devices with Ag electrodes, write voltages and lesser read voltages, and pinpoint electrode surrounded by ring electrode. In particular, pages 12-18 of this document discusses the fabrication of horizontal and vertical structures for memory cells which incorporate the electrolyte doped memory material. Although the exact publication date for this document is not known, it is believed to be available at Arizona State University.

Zhang, et al., J. Non-Cryst. Solids 151 (1992) 149-154: this document generally relates to, inter alia, T_g investigation for glasses.